2023 INTERNET2 TECHNOLOGY exchange

Building The Data Used To Build The Internet2 Route Reports

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What are the Internet2 Route Reports?

- Talk to Steve Wallace! (ssw@internet2.edu)
- If you manage IP resources, you should familiarize yourself with them.
- ”Report Card” for Routing Integrity
- https://github.internet2.edu/ssw/IRR-report/tree/master/Connectors

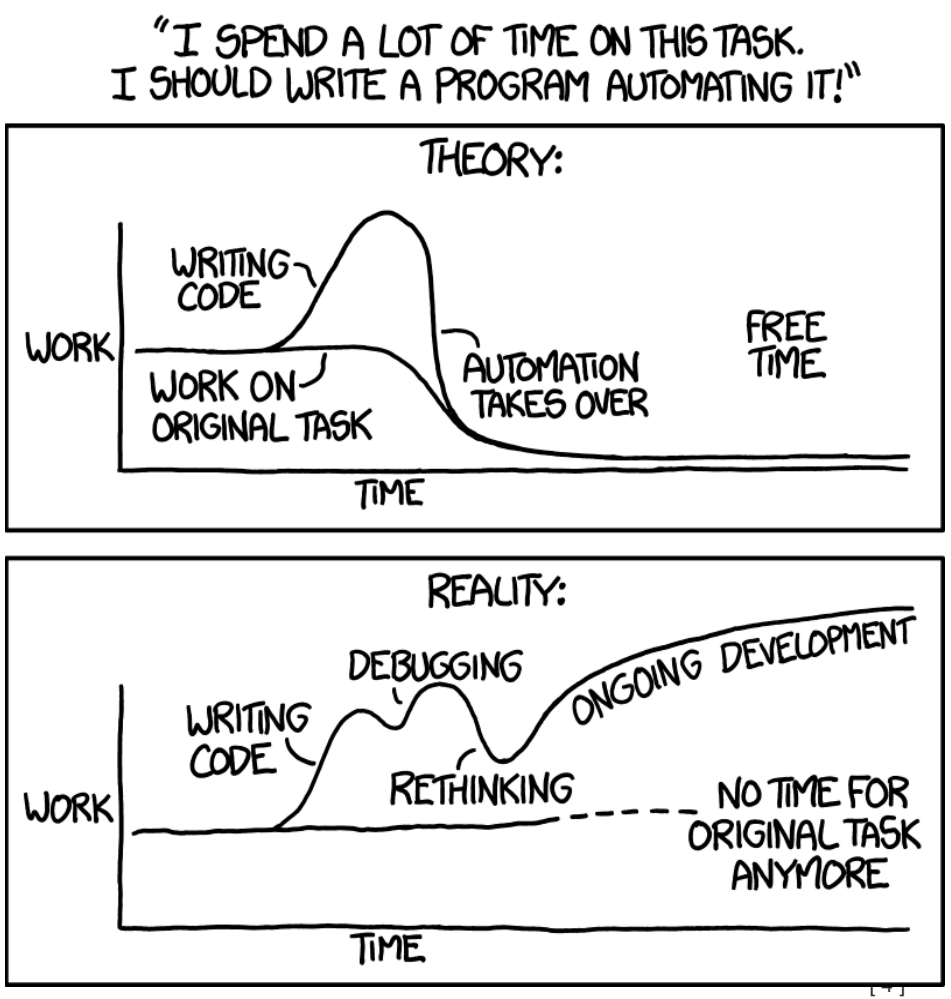
How we “used” to build them?

- Steve’s laptop
- Monolithic python script (2500 lines)
- Lots of manual gathering of data
- External API/Whois Lookups
- Hours to complete
  - API rate limits

- PoC code grew to what it is today
- ”Quick and Dirty”

Why the change?

- **Hugely Popular Reports**
- Ryan likes to automate…
  - Obligatory XKCD
- "Has to be a better way…"
- Steve is allowed PTO
- Time to rethink and refactor.
- Scheduled Runs
- Repeatable
- Quick corrections
- **Lots of other uses for source data**



CI/CD with Gitlab-CI

- “CI/CD is a continuous method of software development, where you continuously build, test, deploy, and monitor iterative code changes.”
- Focused on continuous and/or automated software releases.

- But you don’t have to use it like that…

- I use it like a really advanced cron.
  - Barely scraping the surface.
  - Scheduled Runs
  - Job Dependencies
  - Automated Deployment

- Why not GitHub Actions?

Definitions

- Pipeline
  - End-to-End configuration of the whole process
  - Executed on a schedule or when triggered
- Stage
  - A collection of jobs that do similar tasks
  - All jobs in a stage must finish/succeed before progressing to next stage
    - Configurable
- Job
  - A set of commands needed to complete the work
  - Containers
  - Runners
    - Cloud vs Local

CI Stages

- CI Pipeline Stages
  - Internal mapping data (Connector lists, etc) static files.
- .pre
  - Download previous run data.
    - To check for changes
  - Gather Internet2 Router Output Data
    - Executed in a different repository and CI Pipeline
  - Download Various Datasets
    - RPKI, PeeringDB Info
    - ARIN Bulk Whois, IRR Databases
    - MANRS data, Global Internet Routing Table

CI Stages

- build
  - Compare IRR CURRENTSERIAL data to check for changes
    - If necessary, download updated IRR databases
  - Parse and Pickle IRR Data
    - ~~Read flat text file,~~ parse it into radix trees, pickle it.
  - Pickle RPKI Data
  - Parse ARIN Bulk Whois Data
  - Get AS-SETs and AS Cones
  - Parse Global Routing Table

CI Stages

- test
  - Does output JSON conform to a schema, etc
    - jsonschema
  - Might do some unit testing, probably not much

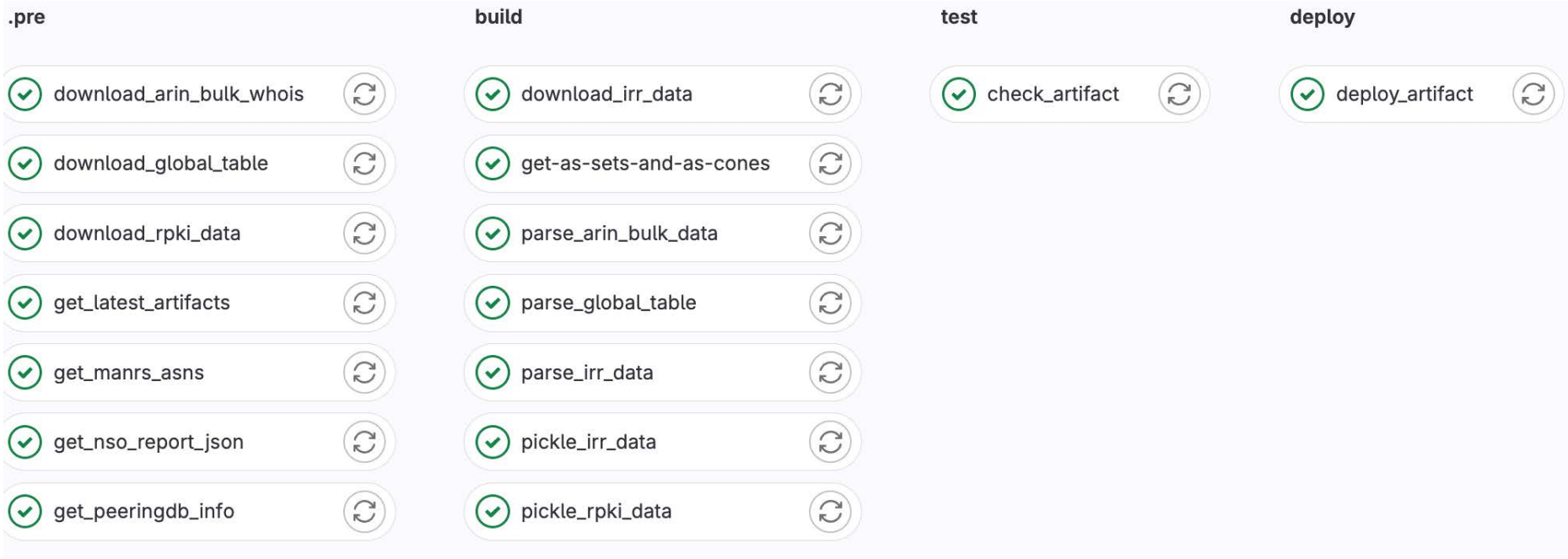
CI Stages

- deploy
  - Kind of a misnomer for this project
  - Bundle all gathered and processed data
    - Easy consumption by downstream projects

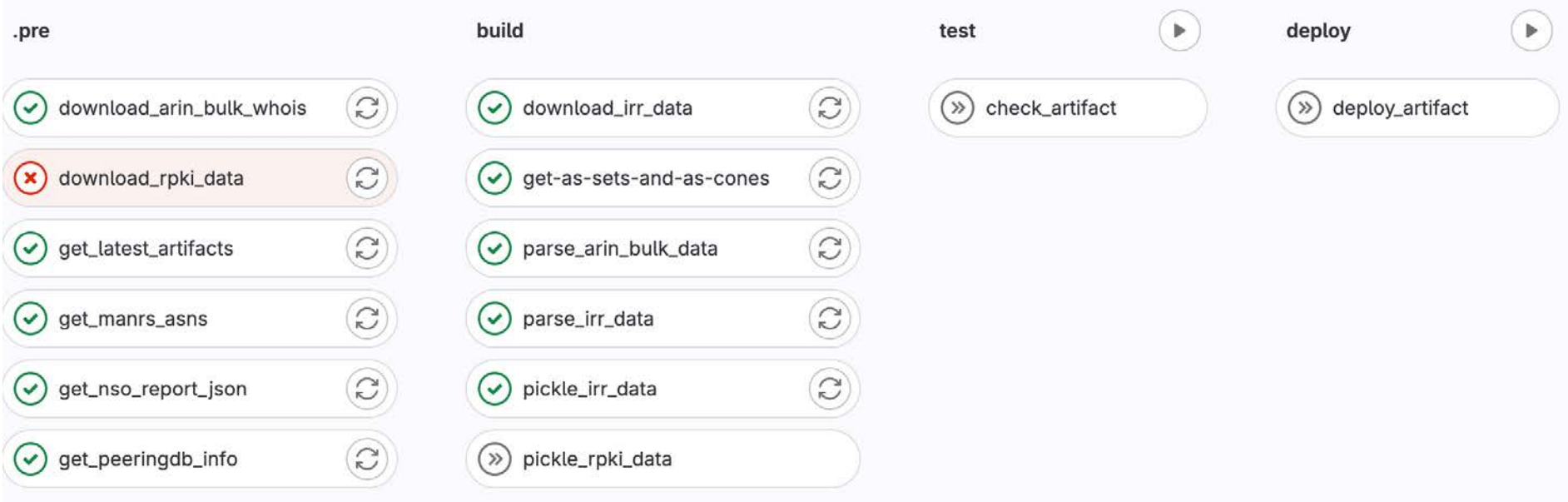
```
parse_global_table:
  stage: build
  tags:
    - security-runner
  script:
    - python parse-bgp-table.py
  needs:
    - job: download_global_table
      artifacts: true
  artifacts:
    name: "Global_Table"
    untracked: false
    expire_in: "1 days"
    paths:
      - "Global_Table/"
    when: on_success
```

```
get_manrs_asns:
  stage: .pre
  needs:
    - job: get_latest_artifacts
      artifacts: true
  script:
    - mkdir MANRS
    - pip install beautifulsoup4 requests
    - python get-manrs-asns.py
  artifacts:
    expose_as: "MANRS_ASNs"
    name: "MANRS_ASNs"
    untracked: false
    expire_in: "1 days"
    paths:
      - "MANRS/"
    when: on_success
  allow_failure: true
```

Stages and Jobs



Stages and Jobs



Job Dependencies

Interesting Notes and Tidbits

- 1100 lines of python (so far)
- 22 minute runtime (Daily)

- Python Pickle
- Radix Trees
- BeautifulSoup (What the heck is that?)
- ~~TTP (Text Template Parser)~~ Hurray!
- FTP? In 2023?

- Foundations done, still working on some details
  - Normalized output
    - AS1234 vs 1234, what about 4-byte ASNs?

THANKS

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